Australian Paediatric Surveillance Unit annual report, 2007

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Background

National active surveillance of rare diseases of childhood, including communicable and vaccine preventable diseases, genetic disorders, childhood injuries and mental health conditions is conducted by the Australian Paediatric Surveillance Unit (APSU). The study of communicable and vaccine-preventable diseases is supported in part by the Australian Government Department of Health and Ageing (DoHA) through its communicable diseases program. In 2007, APSU conducted national surveillance for 10 communicable or vaccine preventable conditions. The rationale for surveillance of each of these conditions is set out below:

1. Acute flaccid paralysis (AFP) is a major clinical presentation of poliomyelitis. The APSU provides clinical information on cases of AFP, via the Australian National Poliovirus Reference Laboratory, to the Australian Polio Expert Committee. The committee determines whether the cases are compatible with polio based on the clinical and laboratory information supplied. After each meeting, the Polio Expert Committee reports to the World Health Organization (WHO) Western Pacific Regional Office. These data are used to determine the polio-free status for Australia, which is reviewed each year by the Regional Commission for the Certification of the Eradication of Poliomyelitis in the Western Pacific Region, convened by WHO.
2. Congenital cytomegalovirus infection is a leading cause of congenital abnormality in Australia. Through this study, APSU aims to provide baseline data on which to base prevention and treatment strategies including trials of potential vaccines and antiviral drugs.
3. Congenital rubella is a vaccine preventable condition rarely seen in Australia. APSU provides a mechanism for identifying cases of congenital rubella, which in recent years have been due to missed school based immunisation or importation. APSU data are useful for monitoring the epidemiology and will inform the development of prevention strategies.
4. Perinatal exposure to HIV is the most frequently reported source of HIV infection in Australian children. The current study monitors new cases of perinatal exposure to HIV and HIV infection in children aged less than 16 years. Information collected through the APSU complements data collected through the National HIV Registry and the National AIDS Registry.
5. Neonatal herpes simplex virus (HSV) infection is a very rare, but serious infection with high morbidity and mortality. Through this study APSU will determine the incidence, mortality and morbidity of neonatal HSV infection in Australia.
6. Hepatitis C virus (HCV) infects an estimated 170 million people worldwide representing a viral pandemic with no vaccine yet available. This study aims to determine the reported incidence of newly diagnosed HCV infection and the prevalence of co-infection with hepatitis B virus and/or HIV in Australian children.
7. Non-tuberculous mycobacteria (NTM) are important environmental pathogens that cause a broad spectrum of diseases. The annual incidence of NTM infections in the developed world is believed to be increasing due to increasing awareness, better identification techniques and changing population groups. However, the magnitude of this problem in children is unquantified. APSU aims to expand on knowledge recently gained in Australia through laboratory surveillance by collecting data on the presentation, treatment and outcome of NTM infection.
8. Neonatal group B streptococcus (GBS) infection is the most common cause of life threatening infections in newborn babies. Early diagnosis and intervention can help decrease the risk of complications. This study aims to determine the incidence of early and late onset infections caused by GBS in Australia and to assess the effectiveness of intrapartum antibiotic use.

9–10 Routine, varicella vaccination is recommended in the latest Immunisation Program Schedule.[1] APSU surveillance for congenital and neonatal varicella provides a unique opportunity to compare current rates and the sources of infection in Australia, to rates reported by the APSU in 1995–1997. Surveillance for severe complications of varicella infection will allow us to describe serious presentations of varicella and through genotyping to identify varicella strains associated with severe complications. Genotyping will also

allow differentiation of vaccine strain from wild-type virus and determine true vaccine failures. These data will inform future vaccine and policy development.[2]

Methods

APSU study protocols are developed with collaborating investigators and/or institutions. Detailed protocols including case definitions for each condition under surveillance are available online.[3] APSU sends monthly report cards listing the conditions under surveillance to approximately 1,270 child health clinicians around Australia. Report cards are returned whether the clinician has a case to report or not, providing a measure of participation rates for the system. Sixty-five per cent of cards are sent and returned via e-mail, the rest via surface mail. All reported cases are followed-up by questionnaire requesting data on the presentation, treatment and short-term outcome.

The APSU aims to provide epidemiological information that is representative of the Australian population and maximal case ascertainment is a high priority. Despite a representative mailing list (93% of all paediatricians in active clinical practice in Australia participate in monthly surveillance) and high response rates (over 90% per annum since 1993), complete case ascertainment is unlikely.[4] This is particularly relevant in remote communities where children have limited access to paediatricians. However, for most conditions studied by the APSU no alternative national data are available to estimate completeness of ascertainment. APSU encourages the use of complementary data sources where available and reporting by a range of specialists to maximise case ascertainment. Reported rates for conditions ascertained through the APSU therefore represent a minimum estimate of the incidence of these conditions in the relevant Australian populations.

Results

All data provided in this report are accurate as at June 2008. It is possible that some notifications may be reclassified or the outcomes may change as additional clinical data are received. In 2007, 1,277 clinicians participated in the monthly surveillance of 16 uncommon childhood conditions, including the 10 communicable or vaccine preventable diseases described here. The report card return rate for 2007 was 92.3%. Enhanced data about diagnosis, clinical management and short-term outcome were available for more than 85% for cases notified. Table 1 shows the number of cases reported in 2007 and for the whole study period and the reported rate per 100,000 population.

Table 1. Confirmed cases identified for 2007 and for the total study period

Condition	Date study commenced	Questionnaire response (%) for total study period	Number of confirmed cases for 2007	Reported Rate for 2007 (per 10^5)	Number of confirmed cases for total study period	Reported rate for total study period (per 10^5per annum)
Acute flaccid paralysis	March 1995	89	26*	0.6†	438*	0.8†
Congenital cytomegalovirus	Jan 1999	68	12	4.5‡	87	3.8‡
Congenital rubella (with defects)	May 1993	95	Nil	Nil	50	0.1†
Perinatal exposure to HIV	May 1993	88	29	10.1‡	331	8.9‡
Neonatal herpes simplex virus infection	Jan 1997	95	7	2.6‡	95	3.4‡
Hepatitis C virus infection	Jan 2003	86	6	0.2†	47	0.2†
Non-tuberculous mycobacteria	July 2004	79	6	0.2†	44	0.3†
Neonatal group B streptococcus infection	July 2005	83	46	17.7‡	135	20.4‡
Congenital varicella	May 2006	100	1	0.4‡	2	0.5‡
Neonatal varicella	May 2006	89	5	1.9‡	13	3.3‡
Severe complications of varicella	May 2006	74	6	0.2†	18	0.3†

* All reported cases that have been classified by the Polio Expert Committee were 'non-polio acute flaccid paralysis' according to WHO criteria.

† Based on population of children aged ≤15 years as estimated by the Australian Bureau of Statistics.[6]

‡ Based on number of births as estimated by the Australian Bureau of Statistics.[6]

APSU data contribute significantly to the national surveillance effort, providing valuable information for clinicians, policymakers and the community.[4,6] The APSU is often the only source of national data that includes clinical and/or laboratory details, and data on both inpatients and outpatients.[4,6] The key findings for infectious diseases under surveillance by the APSU in 2007 are summarised in Table 2.

Studies concluding in 2007

Surveillance for NTM infection finished in September 2007. Adequate data have been collected in order to address the specific aims for this surveillance as determined by the investigators group leading this study, and a journal article is in preparation.

New surveillance studies started in 2007

Acute rheumatic fever

The acute rheumatic fever (ARF) surveillance study is a joint project of the Menzies School of Public Health, The National Heart Foundation of Australia and the APSU. Surveillance commenced in September 2007. The significant burden of ARF

Table 2. Results summary

Condition and principal investigator	Key findings
Acute flaccid paralysis (AFP) Dr Bruce Thorley, Victorian Infectious Diseases Reference Laboratory	In 2007, Australia failed to reach the WHO AFP surveillance target of 1 case per 100,000 aged less than 15 years per annum with only 26 confirmed cases. The primary causes of AFP are Guillain-Barré syndrome and transverse myelitis. Adequate faecal specimens were obtained for 58% of eligible cases which was an improvement on 2006 but below the 80% WHO target. In July 2007, the regional polio reference laboratory in Melbourne, Australia, reported isolation of a type 1 wild poliovirus, from a stool sample of a 22-year-old Pakistani man who had returned to Australia. This is the 1st case of wild polio in Australia in 30 years, and illustrates the need for continued vigilance to detect importations of poliovirus into Australia.
Congenital cytomegalovirus (cCMV) infection Prof. William Rawlinson, Virology Division, Department of Microbiology, Prince of Wales Hospital, Sydney	cCMV is the most common infectious cause of malformations in Australia. cCMV infection was not associated with maternal illness in approximately one third of cases, and should be considered regardless of maternal history. cCMV remains under-diagnosed. Although most cases are diagnosed by urine culture; use of polymerase chain reaction (PCR) for urinary screening for CMV may increase diagnostic yield. Universal neonatal hearing screening programs may also help identify new cases.
Congenital rubella (with defects) A/Prof. Cheryl Jones, The Children's Hospital at Westmead and Discipline of Paediatrics and Child Health, University of Sydney	There were no cases of congenital rubella with defects reported in 2007. As the risk of congenital rubella remains, particularly among immigrant women born in countries with poorly developed vaccination programs, such women should have serological testing for rubella after arrival in Australia, and vaccination when appropriate. Travel to rubella endemic countries in the 1st trimester by women with no prior rubella immunity poses a risk to the foetus of congenital rubella.
Perinatal exposure to HIV and HIV infection Ms Ann McDonald, National Centre in HIV Epidemiology and Clinical Research	In 2007, 29 cases of perinatal exposure to HIV were reported. Four children were born to women whose HIV infection was diagnosed postnatally. HIV infection has been confirmed in three of these children, while 1 child is HIV negative. Twenty-five children were born in Australia to women whose HIV infection was diagnosed antenatally. None of these children have been diagnosed with HIV infection. Twenty-three mothers used antiretroviral therapy in pregnancy and avoided breastfeeding. Antiretroviral treatment and mode of infant feeding were not reported for 2 women. Antenatal diagnosis of the mother's HIV infection and use of interventions continues to minimise the risk of mother-to-child HIV transmission.[7]
Neonatal herpes simplex virus infection (HSV) A/Prof. Cheryl Jones, Herpes Virus Research Unit, The Children's Hospital at Westmead and Discipline of Paediatrics and Child Health, University of Sydney	Over a half of neonatal HSV infections in Australia are caused by HSV type 1, in contrast to the United States of America where HSV type 2 predominates. Typical herpetic lesions of the skin, eye or mouth were not evident in half of infants identified with neonatal HSV infection, which makes early diagnosis difficult. Disseminated HSV infection in the newborn may be associated with the early onset of pneumonitis, in infants (in whom the chest X-ray may be normal). This is highly lethal unless antiretroviral therapy is initiated. Intrauterine HSV infection is rare. It manifests as chorioretinitis, intracerebral calcification, and birth defects.

Table 2: Results summary, *continued*

Hepatitis C virus infection (HCV) A/Prof. Cheryl Jones, The Children's Hospital at Westmead and Discipline of Paediatrics and Child Health, University of Sydney	Perinatal transmission is the main source of HCV infection in Australian children. In the APSU study, infected infants were born to mothers with hepatitis C who used intravenous drugs, had invasive procedures overseas or had tattoos. Most HCV-infected children were clinically asymptomatic with mildly elevated liver function tests at diagnosis, however, HCV induced chronic liver disease and liver failure have been reported among older children.[8] Given that 1%–2% of Australian women of childbearing age are infected with HCV, the reported rate of infected children is lower than predicted. This may be due to the lack of a consistent approach to screening to identify exposed children and HCV infection.[9]
Non-tuberculous mycobacterium infection (NTMI) Dr Pamela Palasanthiran, Paediatric Infectious Diseases Specialist, Department of Immunology and Infectious Diseases, Sydney Children's Hospital Randwick, NSW	This infection usually presents as lymphadenitis predominantly in immunocompetent children. *Mycobacterium avium intracellulare* and *Mycobacterium fortuitum* are the most common organisms isolated in Australian children. *Mycobacterium lentiflavum* is associated with higher relapse rates than other organisms. Microbiology (stain, culture or PCR) is 75.5% sensitive in identifying mycobacterial infection. Surgery is the most frequently offered therapy. Complete surgical excision is associated with a lower risk of relapse. There is marked heterogeneity in the type of antimicrobials used and course prescribed. Despite therapy relapse occurs in about 23% of cases.[10]
Neonatal and infant *Streptococcus agalactiae* (group B streptococcus – GBS) sepsis Prof. Lyn Gilbert Centre for Infectious Diseases and Microbiology, Institute for Clinical Pathology and Medical research, Westmead Hospital, Westmead NSW	Over a half (59%) of the reported cases have early onset of disease (at less than 8 days of age). The number of notifications received so far are consistent with other available data. Reported rates of confirmed GBS infection were higher in New South Wales/Australian Capital Territory than in other states during 2007. Pre-term birth is significantly associated ($p < 0.05$) with late-onset cases (infants aged 9 days or more). Group B streptococcus isolates have been collected for approximately 70% of cases and will be genotyped.
Severe complications of varicella infection Prof. Robert Booy National Centre for Immunisation Research and Surveillance, The Children's Hospital at Westmead, NSW	Six children were hospitalised with complications of varicella in 2007 (median age = 6 years; range 9 months to 12 years). Complications included bacteraemia, osteomyelitis, cellulitis, pneumonia, and ataxia. Median stay in hospital was 10 days (range: 5–18 days). All children were unvaccinated and family members were the infecting contacts. Severe complications of varicella pose a significant burden on affected children.
Congenital and neonatal varicella As above	One case of congenital varicella was reported in New South Wales in 2007. The infant was infected during the gestation period and the mother received anti-viral therapy. Five cases of neonatal varicella were reported. One neonate with pneumonitis was ventilated. Family members were the infecting contacts for both congenital and neonatal varicella.

has been recognised among Indigenous children and control programs and data collections in the top end of Australia have been invaluable. However, we know little about the incidence of ARF in the rest of Australia although the Australian Bureau of Statistics estimates that approximately 30% of Australia's Indigenous population lives in New South Wales.[11] The incidence of ARF in the non-Indigenous population is unknown, and this study may provide preliminary information on other high risk groups such as refugees. In order to improve surveillance coverage in rural and remote regions the APSU will recruit additional key clinicians from these areas. This is an important capacity building step for the APSU surveillance mechanism.

Intussusception

Surveillance for intussusception (IS) commenced in July 2007 after the introduction of rotavirus vaccination onto the Australian Immunisation Schedule,[1] and this study is led by Professor Julie Bines from the Department of Gastroenterology, Royal Children's Hospital, Melbourne. IS has been recognised as a potential complication of rotavirus vaccination,[12]

and the APSU study will provide information on the diagnosis and clinical management of intussusception and any temporal association between rotavirus vaccination and intussusception.

Influenza

In September 2007, APSU was commissioned to conduct rapid response surveillance for severe complications of influenza in children aged less than 5 years. The study was mounted within 10 days of commissioning and weekly rather than monthly surveillance was conducted. The results from this 1 month trial suggest that surveillance for severe complications of influenza is feasible and could again be conducted during the influenza season in 2008. If the study was repeated we would include children aged less than 15 years as there were several reports of very serious complications of influenza in this age group in 2007.[13]

Future directions

APSU surveillance provides valuable detailed clinical, treatment and outcome data on several infectious or vaccine preventable conditions simultaneously and is a valuable adjunct to other national surveillance systems. However, APSU surveillance of conditions such as AFP, where biological samples are required and timely identification of cases is essential, could be improved. To address these limitations APSU, in collaboration with the National Centre for Immunization Research and Surveillance, is currently piloting a Paediatric Active Enhanced Disease Surveillance (PAEDS) system in 4 tertiary paediatric hospitals in 4 states of Australia, with reporting by dedicated nurse specialists.[14]

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